IJEM
International Journal of Economics and Management
Journal homepage: http://www.ijem.upm.edu.my

Resilient Trade During The COVID-19 Pandemic: Why Does Export Diversification Matter?

MUHAMMAD DAANIYALL ABD RAHMAN[a,b*], MOHAMAD KHAIR AFHAM MUHAMAD SENAN[a], NOR YASMIN MHD BANI[a], FUTU FATURAY[c] AND MOHD YUSOF SAARI[a,b]

[a]*School of Business and Economics, Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia*
[b]*EIS-UPMCS Centre for Future Labour Market Studies, Social Security Organisation, Malaysia*
[c]*Fiscal Policy Agency, Ministry of Finance Indonesia, Indonesia*

ABSTRACT

Trade economists emphasised that export diversification plays an essential role to mitigate trade shocks. Nevertheless, little empirical evidence justified the argument regarding pandemic-led disruption effects. The study examines the role of export diversification in mitigating the adverse effect of the coronavirus disease (COVID-19) pandemic in Malaysia. The results suggest that a country-based export diversification plays a vital role in minimising COVID-19 exports disruptive effect, with greater weight on the regional trade. Nevertheless, long-term product diversification is relatively beneficial to promote growth and trade resilience.

JEL Classification: F10, F13, F62
Keywords: International trade; Export diversification; Covid-19; Malaysia

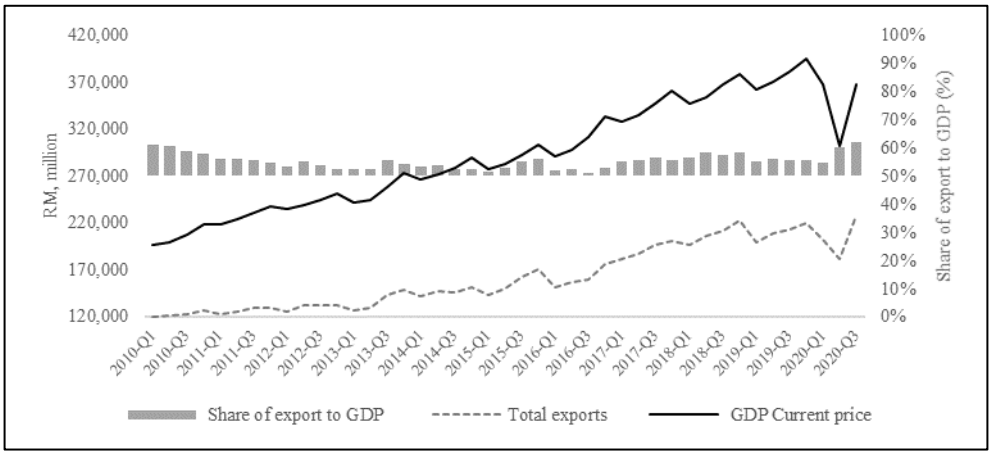
Article history:
Received: 24 May 2021
Accepted: 22 April 2022

* Corresponding author: Email: daaniyall@upm.edu.my
DOI: http://doi.org/10.47836/ijeamsi.16.1.004
© International Journal of Economics and Management. ISSN 1823-836X. e-ISSN 2600-9390.

INTRODUCTION

The COVID-19 pandemic is a health crisis that morphed into a global economic crisis. The disruptions caused by the pandemic inflated from a local to global scale. Apart from the public health concern, debates and discussions assert the adverse impact of the pandemic on world trade. In a world of complex supply chains, external trade is the backbone in the fragmented international production where product supply chains are dispersed to various industries across geographical borders. Dependencies on other countries increase as each country specialises in a different niche production area that develops parts and components for the final product. Considering the current trade shock, the demand and supply shocks in the pandemic-affected countries cause the inoperability of economic activities, particularly the export-oriented industries. Thus, an open economy with a larger trade network could be impacted by the pandemic, thus creating greater economic risks.

The effect of COVID-19 on the Malaysian economy is substantial between the first and second quarter of 2020 (Q1-2020 and Q2-2020), which flattened the gross domestic product (GDP) from RM367.2 billion to RM301.8 billion. Moreover, the total exports declined from RM201.8 billion in Q1-2020 to RM182.1 billion in Q2-2020. Meanwhile, the total exports share to GDP consistently accounted for more than 60% of GDP, indicating the importance of external trade to the Malaysian economy. Thus, the global scale pandemic caused massive worldwide supply chain disruption and significantly impacted the Malaysian economy through exports shortfall. Although the situation is expected during an economic shock, a rapid recovery effect was demonstrated after the resumption of economic activities at the beginning of the third quarter of 2020 (Q3-2020). Interestingly, the total exports in Q3-2020 (RM227.5 billion) resumed immediately after the economy restarted and exceeded the Q4-2019 total exports level recorded at RM219.7 billion.



Note: The bar chart axis for share of export to GDP is re-scaled to present the highest percentage in the time-series.

Source: Authors' illustration based on data from Department of Statistics Malaysia

Figure 1 Malaysia total exports and GDP performance

The export recovery trend raises an important question on the extent to which export diversification plays a role in reducing trade shocks during the pandemic. As an open and developing economy, Malaysia is exposed to economic volatility on which trade is a significant transmission mechanism of external shocks (Balavac and Pugh, 2016). The persistent large share of exports to GDP is a strong premise where the economic risk lies. Thus, Malaysia is not excluded from the repercussion of pandemic-led trade shocks. Nonetheless, recent economic literature highlights the role of export diversification to minimise economic shocks. Hence, the study examines the extent to which export diversification mitigates the adverse effects of trade shocks due to external events. The COVID-19 pandemic became the central discussion of trade economists to identify the impact on international trade.

The study contributes to recent research in two main channels. From the scientific perspective, the study adopts existing modelling to analyse the impact of export diversification on export, which extends the

application to assess the recent world health crisis using a recently published dataset. Malaysia was selected to present a unique case of a small and open developing country that depends highly on exports. From the policy perspective, the study benefits policymakers by providing an evidence-based assessment of the potential impact of exports diversification on pandemic-led trade disruption. The findings can be a reference to understanding the idiosyncratic role of export diversification on international trade by employing an empirical approach. The conclusion section discusses policy insights on progressive world trade.

The study is organised as follows. Section 2 provides a brief discussion on previous literature on export diversification. Section 3 elaborates the methodology and data sources, while Section 4 presents the results and discussion. Finally, Section 5 concludes with relevant policy recommendations.

LITERATURE REVIEW

The conventional trade theories describe the effectiveness of resource dominant countries under international free trade settings to focus on specific industries by emphasising product specialisation based on its comparative advantages (Ricardo, 1817). Conversely, Prebisch (1962) and Singer (1975) argued that the conventional trade arguments create excessive specialisation, making the developing countries static and remain as low value-added raw material exporters while running on labour-intensive activities. Meanwhile, developed countries dominate high value-added industrialised products with higher capital intensity (Mania and Rieber, 2019). The situation hauls developing countries into lower-quality exports due to low productivity levels, low-income elasticity levels, and low skills composition, thus exposing the countries to strong price fluctuations. The conditions denounce the countries to export earnings volatility which leads to an 'immiserising' growth.

The trade literature revealed that export diversification reduces external demand shocks and provides a conducive condition for technological spillovers for developing countries (Mania and Rieber, 2019). Thus, the following literature discusses the comparative advantages theory to structuralist approach that supports the structural change process in developing countries that are driven by diversification and composition of exports (Cimoli et al., 2008; Osakwe et al., 2018). Imbs and Wacziarg (2003) emphasised the role of structural preferences to determine the sectoral diversification level that depends on the country economic background. Interestingly, diversification holds a non-monotonic relationship to growth that resembles a U-shape pattern, where countries begin diversifying on a first stage where the sectoral distribution of economic activity starts re-concentrating as level per capita income increases. Additionally, Osakwe et al. (2018) summarised that the contributions of export diversification to growth and development results from increased investment in various economic activities, distributional effect across industries through supply chain spillover, and improved manufactured export quality.

Saviotti and Frenken (2008) presented a deeper investigation on export diversification impact on growth that mainly depends on the type of diversification patterns. The behaviour of diversification impact on growth is affected by different levels of exports diversification or 'export variety'. Specifically, export variety is divided into *related variety*, *semi-related variety*, and *unrelated variety* using the decomposable entropy approach. The three export variety indicators portray growth differentials, which is relative to time scales, costs, and risks. For example, the *related variety* is the variety within a sector producing closely related products and services, which tends to stimulate growth in shorter periods than the *unrelated variety*, but is correspondingly vulnerable to external shocks arising from technological changes and shifts in preferences (Krugman, 1993). Thus, external shocks are inevitable in the current pandemic situation due to virus containment measures that induced unprecedented supply and demand shocks worldwide. Therefore, because the export variety holds potential for shorter period growth despite the measurement approach, the situation presents a "clue" to potential benefits of export diversification to minimise the impact of the pandemic and accelerate economic recovery.

The literature provides a strong justification that export diversification plays a role in providing economic resilience and hindering unprecedented economic shocks during the COVID-19 pandemic. Although increasing empirical or quantitative assessments investigate the impact of COVID-19 on trade, most studies on the role of exports diversification are qualitative. Maliszewska et al. (2020) examined the impact of

the COVID-19 pandemic on trade at a macro perspective by using the computable general equilibrium (CGE) model. The study found that developing countries are affected the most, experiencing GDP reduction and negative impacts on exports in the presence of higher international trade costs, reduced travel services, and redirection of consumer demands depending on the country-specific output and exports initial composition. Additionally, micro studies at firm level assessed the pandemic impact on exporting firms or multinational companies (Yong and Laing, 2020; Zhang, 2021). The COVID-19 outbreak created short-run adverse impacts on the firms. Nonetheless, the reversal effect matches in the long run following the diversification and economic cooperation effects.

Limited trade literature highlights export diversification during the pandemic, focusing on the impact of the global financial crisis instead of pandemic-led economic shocks. For example, Neto and Romeu (2011) and Lee and Yu (2019) investigated the effect of global financial crisis on exports by examining the migitating role of export diversification. Furthermore, economic volatility was extensively discussed concerning diversification. Economic volatility is associated with resources dependent production (mining and agriculture), particularly in developing countries where the exports are highly exposed to price volatility in the commodity market. Thus, the economic production shift from resource-based to manufacturing production increases stability following the diversification effect (Moore and Walkes, 2010; Papageorgiou et al., 2015). Moreover, diversification extends beyond shifting to a more complex production (manufacturing), which involves time-dependent structural change. A robust strategy to minimise crisis impacts includes the extent to which a country participates in the global production network with diversified suppliers worldwide (Miroudot, 2020).

METHODS

The section explains two main approaches in assessing the impact of export diversification on the Malaysian trade concerning product and country diversification. First, the study measured export diversification using the Hinderfahl concentration index. Second, the study formulated an econometric model based on Neto and Romeu (2011) and Lee and Yu (2019) empirical framework.

Measuring export diversification

Neto and Romeu (2011) and Lee and Yu (2019) employed the conventional Hinderfahl index approach to measure trade concentration. Accordingly, the study adopted a similar approach to construct the Hinderfahl index for Malaysian exports. Summarily, the index was calculated according to a share of products group, *k*, to the total product categories, *n*. The final index was obtained from the sum of the squared shares for a specific product group as presented in Eq. (1). Technically, the Hinderfahl index ranges from 0 to 1, indicating high diversification (low concentration) to low diversification (high concentration), as defined by Neto and Romeu (2011), Lee and Yu (2019), and Akbas and Sancar (2021). Hence, the study predicted the value of the Hinderfahl index to be close to zero to justify the export diversification.

$$H = \sum_{k=1}^{n} S_k^2 \tag{1}$$

The use of the Hinderfahl index extends beyond measuring the diversification for the exports product group. The index also calculates the diversification of export destinations. Therefore, two types of diversification were examined, namely product diversification and country diversification.

Model specification

The empirical model was established by adopting empirical estimation in Neto and Romeu (2011) and Lee and Yu (2019). The model was based on Anderson and Van Wincoop (2003) monopolistically competitive trade framework as follows:

$$ex = f(exr, dist, CPI, HIP, HIC) \quad (2)$$

where ex represents exports value per GDP as a dependent variable that evaluates the intensity of exports or export size by-product based on the exports destinations. The calculation is similar to He and Xu (2021) on export demand function and consistent with the nonprice competitiveness factor following Kaldorian literature (see Romero and McCombie, 2017). The study included HIP and HIC in the model to represent export diversification of product and country concentration (Neto and Romeu, 2011; Lee and Yu, 2019). The study examined the influence of export diversification on the export intensity within Malaysia global framework by extending the model to include other variables, such as exchange rate: exr (Malaysia ringgit to exports destination local currency exchange), distance: $dist$, and consumer price index of the exports destination country: CPI.

Eq. (2) was modified to include the interaction between COVID-19 periods and the export diversification variables to measure the impact of COVID-19 on export intensity and to understand the extent to which export diversification plays a role in mitigating the adverse impacts. The study recorded the COVID-19 periods between Q1-2020 and Q2-2020 using dummy variables with a value of one for both pandemic periods and zero otherwise. Furthermore, the study applied a similar basis to analyse the extent to which major regional trade blocs (European Union and ASEAN) indicate deploying a mitigating effect on the disruption of Malaysian exports during the pandemic periods. Therefore, a dummy variable was introduced for countries within each of the trade blocs. Hence, five idiosyncratic models were estimated in the study.

Data sources

Malaysian exports data by-products and destination countries were gathered from the Department of Statistics Malaysia at a two-digit harmonised system (HS) code (refer to Table A1 in the appendix). The data were expressed in Malaysia Ringgit (MYR) spanning from the first quarter of 2012 (Q1-2012) to Q2-2020. Exports data for Q1-2020 and Q-22020 are sufficient to record the COVID-19 pandemic period. The exports by-products before March 2017 are based on HS2012, while the HS2017 code starts from April 2017. The study used a two-digit HS code, hence the study expected no significant classification difference at the widely aggregated product code level.

In line with the exports data, the study collected the Malaysian GDP data at a quarterly frequency. The distance indicates the distance of the capital city of each Malaysian export destination available at the geographical distance (GEODIST) database[1]. The consumer price index (CPI) and exchange rates are available at the monthly and daily datasets respectively, which were collected from the International Financial Statistics and averaging at a quarter level.

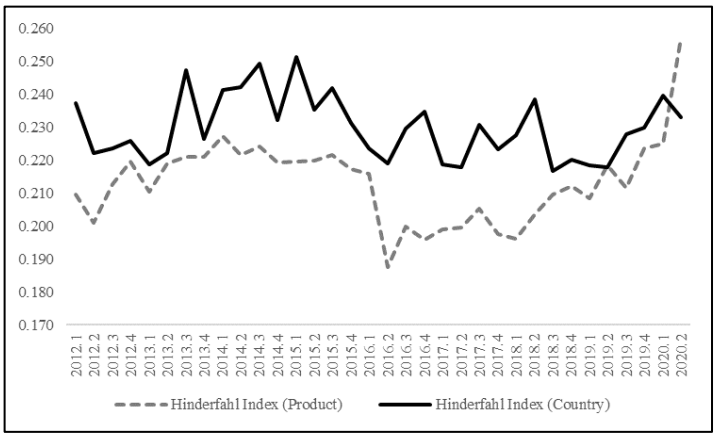
RESULTS AND DISCUSSIONS

The section presents and discusses the results obtained from the empirical models. First, a trend analysis is presented based on the calculated export diversification index spanning before and during the COVID-19 pandemic periods, followed by the empirical results using the models.

[1] http://www.cepii.fr/CEPII/en/bdd_modele/download.asp?id=6

Malaysia export diversification before and during the COVID-19 pandemic

Figure 2 illustrates the pattern of Malaysian export diversification. The Hinderfahl indices for product and country ranged from a minimum of 0.190 to a maximum of 0.260 within the 34 quarterly time-series periods. The overall export diversification was close to zero as predicted, scoring less than the index median range. On average, the overall Malaysian export was relatively diversified. The study revealed two important findings. First, the Hinderfahl index for the country was stable, fluctuating around 0.230 throughout the study periods. Additionally, the highest index was in the first quarter of 2015 (Q1-2015) at 0.251, the lowest index was 0.218 in the second quarter of 2019 (Q2-2019). Second, the Hinderfahl index within the whole study period for the product was lower than the index for the country. The pattern suggests that product diversification is more prominent for Malaysian exports. Nonetheless, the pattern indicated a 'reversal' trend beginning from the second quarter of 2016 (Q2-2016). Subsequently, the product diversification index continued to increase before surpassing the country index during the COVID-19 periods.

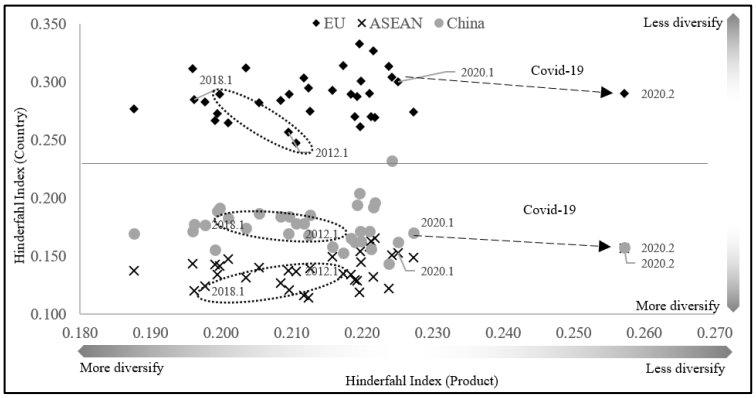


Note: Straight and dashed horizontal lines represent mean of country and product diversification indices, respectively.

Source: Authors' calculation and illustration

Figure 2 Average quarterly Hinderfahl index of HS-2 digit code from Q1-2012 to Q2-2020

Figure 2 can be further assessed to understand the extent to which country diversification in different major regions plays a role in minimising the adverse effect of external trade shock within the study periods. The study categorised the country diversification index into three main regions, namely European Union (EU) bloc, ASEAN countries bloc, and China. The regions were selected due to being highly affected by COVID-19 cases during the study periods and being the main trading partners with Malaysia. Meanwhile, China was considered a single country in the study as the country is the largest destination for Malaysia product exports to date. Moreover, the contagious outbreak originated from China, which causes global-scale disruption to external trading operations that directly affected Malaysia as a trading partner. Figure 3 illustrates country diversification index (y-axis) against product diversification index (x-axis), depecting a dynamic pattern of diversification for Malaysian exports.



Note: Horizontal line indicates the average country diversification index as similarly shown in Figure 1.

Source: Authors' calculation and illustration

Figure 3 The dynamics of export diversification for Malaysian exports between Q1-2012 and Q2-2020

Figure 2 indicates that Malaysia achieved country diversification based on the lower and stable Hinderfahl index, while Figure 3 provides several counter-intuitive findings. The findings are divided into two parts: before the pandemic and during the pandemic. Before the pandemic, Malaysian exports to the EU deepened because, during most of the periods, the Hinderfahl index for the EU was relatively higher than the average score (horizontal line). The Hinderfahl index between 2012 and 2018 also provides a strong indication of a tendency that the export concentration gap between the two periods come with less diversification (see the eclipse shape for the EU). Thus, a higher export concentration to a specific region entails economic risk to Malaysia of the existence of trade shocks.

A trend of export diversification is more notable in the ASEAN countries and China. Although the two regions present a diversification trend, the capacity of reducing the economic risk remains concealed. Abd Rahman et al. (2019) argued that ASEAN entirely is not competitive and requires the economies to adhere to a complementary regional trade agreement to support the growth of the trade bloc (ASEAN+3). Therefore, the study examines the role of the region in absorbing the economic shock due to the pandemic. Finally, the impact of trade shock during the pandemic periods is clear. Although country-based export diversification did not change despite the region type, the product export diversification suggested a dramatic change (the right-hand side of Figure 2). Thus, the trend suggests that product diversification is more vulnerable during the pandemic. Nevertheless, the trend is more apparent during the pandemic which represents the whole trade structure before the economic disruption. Thus, deeper investigation is needed to verify the descriptive argument.

Empirical results

Table 1 presents the empirical results of the pool regression analysis from five different models based on Eq. (1). For the baseline model, the study included the Hinderfahl index for products and countries to measure the role of export diversification on Malaysian exports. The study discovered that product and country diversification indicated diverge impacts on Malaysian overall exports. Meanwhile, product diversification prevailed the desired effect of statistical significance at a one per cent level. Contrarily, country diversification reflected a different impact despite an insignificant coefficient.

In the long run, product diversification is beneficial to promote export growth for the Malaysian economy. Lee and Yu (2019) mentioned that a negative sign represented by the coefficient of product diversification explains the exported product could reduce the impact of trade shock in the long term. Nonetheless, a different perspective was recorded when the COVID-19 periods were included in the models. To test the effect, the study interacted the export diversification index with the COVID-19 dummy variable as represented in Model 2 (column 3 of Table 1). Focusing on the interaction term, country diversification presented a greater tendency to reduce the impact of the COVID-19 pandemic on Malaysian exports.

Table 1 Result of Pool OLS

Independent variables	Model 1 (Baseline)	Model 2 (Covid-19)	Model 3 (EU)	Model 4 (ASEAN)	Model 5 (China)
Column: (1)	(2)	(3)	(4)	(5)	(6)
Exchange rate	0.012***	0.013***	-0.0286***	0.034***	0.0191***
	(4.00)	(4.20)	(-9.30)	(10.70)	(6.33)
Distance	-0.913***	-0.913***	-0.828***	-1.115***	-0.888***
	(-106.90)	(-106.88)	(-94.68)	(-80.03)	(-103.67)
CPI	0.006	-0.020	-0.612***	-0.278***	-0.009
	(0.12)	(-0.43)	(-12.76)	(-5.82)	(-0.18)
Hinderfahl index for product (HIP)	-1.478***	-1.490***	-1.712***	-1.392	-1.509***
	(-116.51)	(-115.56)	(-125.98)	(-97.53)	(-118.14)
Hinderfahl index for country (HIC)	0.0210	0.034*	0.268***	-0.180	0.035*
	(1.48)	(2.33)	(17.28)	(-11.10)	(2.45)
HIP x Covid-19 dummy		0.124***	0.110**	0.121**	0.117**
		(3.31)	(3.00)	(3.28)	(3.17)
HIC x Covid -19 dummy		-0.231***	-0.246***	-0.238***	-0.220***
		(-5.25)	(-5.68)	(-5.55)	(-5.08)
HIP x EU dummy			0.791***		
			(41.30)		
HIC x EU dummy			-0.399***		
			(-15.14)		
HIP x ASEAN dummy				-0.429***	
				(-17.29)	
HIC x ASEAN dummy				0.769***	
				(30.45)	
HIP x China dummy					-0.137
					(-1.66)
HIC x China dummy					-1.118***
					(-10.88)
Constant	-0.491*	-0.379	1.993***	2.572***	-0.749
	(-2.17)	(-1.66)	(8.65)	(9.75)	(-3.28)
N	120,697	120,697	120,697	120,697	120,697
F-test	0.000	0.000	0.000	0.000	0.000
R-squared	0.1524	0.1527	0.1798	0.1594	0.1675

Note: Figures in the parentheses are heteroscedasticity-robust t-statistics. ***, **, and * denote the level of significance at 1%, 5% and 10%, respectively.

Source: Authors' calculation

A detailed examination of the role of main trading partners in reducing the trade shock during the pandemic period was performed in Model 3-5. The interaction terms with the two types of export diversification (HIP and HIC) were introduced for EU, ASEAN, and China, respectively. Three main findings were highlighted from the estimations. First, the results suggested that regional trade is the core resistant to the pandemic-led trade shock for Malaysian exports and during the pre-math of the pandemic. Notably, the EU and ASEAN regions presented the strongest magnitude for the interaction term in country diversification. Based on columns (4) and (5), the coefficients for interaction terms between COVID-19 and HIC for the EU and ASEAN were relatively larger than the similar term in column (3) when the regional dummy is absent. Thus, country diversification plays a role in mitigating the impact of trade shock based on a collective trade partnership. Geographically diversified supply chains enhance production resilience by reducing the need to confront supply shortages due to exports restriction (Hoekman et al., 2020).

Second, the findings implied that product diversification does not play an important role to reduce the impact of trade disruption due to the COVID-19 pandemic. The results were consistent for Model (2) to Model (5) despite the exports main trading partners. Based on the results with the findings in Figure 2, the product diversification index was greatly affected during the outbreak. The logical reason behind the result is that the pandemic containment measures by the government, such as lockdown and movement control order result in economic inoperability that disrupts the demand and supply of exported products, thus weakening the role of product diversification to minimise the pandemic-led exports turmoil.

Third, the results suggested that product diversification is limited to a set of products where Malaysia holds a comparative advantage and the products dominate a large proportion of exports shares. Recent trade statistics signify that Malaysian exports shares are dominated by Electrical and Electronic products (39.5%), Petroleum products (6.4%), Chemicals and Chemical products (5.2%), Palm Oil (4.5%), Rubber products

(4.3%), and Optical and Scientific Equipment products (4.3%)[2]. Meanwhile, the study calculations indicated that product diversification indices were relatively low. For example, the Hinderfahl index for Electrical and Electronic products was 0.103, indicating that the product group was relatively more diversified than primary product exports that suggested a larger index (less diversified), such as Live Animals (0.927) and Ores, Slag, and Ash (0.734).

Based on a smaller diversification index and larger exports shares, the former product group to a greater extent absorbs the pandemic-led trade shocks (Lee and Yu, 2019). The counter-intuitive argument is explained by the fact that the COVID-19 pandemic created a massive economic disruption, significantly interrupting the local and global supply chain (Lenzen et al., 2020). Hence, the situation largely affected the export performance during the period, diminishing the role of product export diversification to mitigate the trade shortfalls. Nevertheless, future studies should investigate further the role of the global supply chain in inducing or reducing exports performance that requires an extensive global inter-industry database, which is beyond the study scope.

CONCLUSION

During the COVID-19 pandemic, the global trade remains operable but at a limited and restricted scale due to production slowdown and pandemic containment measures. Nonetheless, reopening the economy after a strict control movement order created significant improvement in the Malaysia trade performance, which reflects the extent to which exports diversification rendered a re-stabilisation role. The study quantified the extent to which export diversification plays a role in impeding the effect of international trade shortfalls during the pandemic. The study focused on Malaysian and performed an empirical assessment on an export model to measure the role of export diversification on product and country diversification. The findings suggest that during the economic shock of the pandemic, diversification in trade partners is more significant in mitigating the adverse impacts. Particularly, regional trade alliances became the core resistance to cushion the trade shocks compared to product diversification, which is more vulnerable to supply shock during the pandemic. Nevertheless, the results are limited to a short term effect where product diversification is relatively more important for long-term export growth.

The results present two important policy recommendations. First, the government should strengthen the regional trade during self-sufficiency pressure. A crucial policy debate to avoid supply shortages includes the need to secure domestic supplies, such as food and medical supplies in the middle of the COVID-19 outbreak. A new setup to enhance economic growth and sovereignty involves rethinking self-sufficiency by producing more local products. Nonetheless, the option is not favourable in building a robust supply chain. Integration of local supply and international trade works best where the regional supply chain can be further enhanced to support regional growth and emerge as a regional stronghold among the member countries to absorb economic shocks. For example, ASEAN economies embarked on progressive free trade agreements where all member countries could benefit. Resiliency and sustainability of regional supply chains can be promoted through expediting trade facilitation through harmonised regional standardisation, keeping the market open for trade and investment by refraining unnecessary measures that hinder the flow of goods, and strengthening supply chain connectivity with more integrated data sharing.

The second policy recommendation entails achieving economic resilience through product diversification. A short-term trade shock is a clear deterrent to economic progress but the situation can be rapidly recovered in the presence of diversification. Long term growth is more prominent when product diversification is established, which creates a more resilient way to offset post-pandemic distress. During a complex global value chain where Malaysia is participating, the core infrastructures (including physical infrastructure, policy-mix, and incentives to attract investment) are well-established but emphasise product diversification, which can be further strengthened to enhance the value chain and create competitive advantages. Industrial policies should be accompanied by growth-promoted diversification strategies that encourage research and development, innovation, and technological adoption, particularly among small and

[2] MATRADE: Trade and Market Information (www.matrade.gov.my)

medium enterprises. The practice ensures new and high value-added products can be created that utilise domestic resources where the country holds a comparative advantage.

ACKNOWLEDGEMENT

The authors would like to thank the anonymous reviewers for their comments and suggestions to improve this manuscript. Special thanks to Mira Shafiqah Samsuri, Henny Abigailwilyen Sinjus and Muhammad Nabil Al-Fattah Muhammad Yazid for their early contributions in preparing this manuscript. The authors also highly appreciate inputs from Prof Dr Law Siong Hook, Associate Professor Wan Azman Saini Wan Ngah and Dr Anitha Rosland for their insightful comments.

REFERENCES

Abd Rahman, M. D., Saari, M. Y., Lenzen, M. and Malik, A., 2019. Skills and Ethnics Wage Inequalities Within the Global Value Chain: An Evidence from Malaysia. *Policy Studies*.

Akbas, Y. E. and Sancar, C., 2021. The Impact of Export Dynamics on Trade Balance in Emerging and Developed Countries: An Evaluation with Middle Income Trap Perspective. *International Review of Economics and Finance*, *76*, pp.357-375. https://doi.org/10.1016/j.iref.2021.06.014

Anderson, J. E. and Van Wincoop, E., 2003. Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review*, *93*(1), pp.170-192. https://doi.org/10.1257/000282803321455214

Balavac, M. and Pugh, G., 2016. The Link between Trade Openness, Export Diversification, Institutions and Output Volatility in Transitions Countries. *Economic Systems*, *40*, pp.273-287.

Cimoli, M., Porcile, G. and Rovira, S., 2010. Structural Convergence and Balance-Of-Payments Constraints: Why did Latin America Fail to Converge. *Cambridge Journal of Economics*, *34*(2), pp.389-411.

He, Y. and Xu, K., 2021. Export Bias Related to its Long-Run Equilibrium in China. *Applied Economics Letters*, *28*(13), pp.1130-1136. https://doi.org/10.1080/13504851.2020.1803478

Hoekman, B., Fiorini, M. and Yildirim, A., 2020. COVID-19: Export Controls and International Cooperation. In COVID-19 and Trade Policy: Why Turning Inward Won't Work, edited by Richard, E. B. and Simon, J. E., pp. 77-87. London, United Kingdom: CEPR Press.

Imbs, J. and Wacziarg, R., 2003. Stages of Diversification. *American Economic Review*, *93*(1), pp.63-86. https://doi.org/10.1257/000282803321455160

Krugman, P., 1993. Lessons of Massachusetts for EMU. In Adjustment and Growth in the European Monetary Union, edited by Francisco, T. and Francesco, G., pp. 241-266. Cambridge: Cambridge University Press.

Lee, J. and Yu, B.-K., 2019. The Effects of Export Diversification on Macroeconomic Stabilization: Evidence from Korea. *KDI Journal of Economic Policy*, *41*(1), pp.1-14.

Lenzen, M., Li, M., Malik, A., Pomponi, F., Sun, Y.-Y., Wiedmann, T., Faturay, F., Fry, J., Gallego, B., Geschke, A., Gomez-Paredes, J., Kanemoto, K., Kenway, S., Nansai, K., Prokopenko, M., Wakiyama, T., Wang, Y. and Yousefzadeh, M., 2020. Global Socio-Economic Losses and Environmental Gains from the Coronavirus Pandemic. *PLoS ONE*, *15*(7), pp.1-13. https://doi.org/10.1371/journal.pone.0235654

Maliszewska, M., Mattoo, A. and van der Mensbrugghe, D., 2020. The Potential Impact of COVID-19 on GDP and Trade: A Preliminary Assessment. *Policy Research Working Paper no. 9211*. The World Bank.

Mania, E. and Rieber, A., 2019. Product Export Diversification and Sustainable Economic Growth in Developing Countries. *Structural Change and Economic Dynamics*, *51*, pp.138-151. https://doi.org/10.1016/j.strueco.2019.08.006

Miroudot, S., 2020. Resilience Versus Robustness in Global Value Chains: Some Policy Implications. In COVID-19 and Trade Policy: Why Turning Inward Won't Work, edited by Richard, E. B. and Simon, J. E., pp.117-130. London, United Kingdom: CEPR Press.

Moore, W. and Walkes, C., 2010. Does Industrial Concentration Impact on the Relationship between Policies and Volatility?. *International Review of Applied Economics*, *24*(2), pp.179-202. https://doi.org/10.1080/02692170903424315

Osakwe, P. N., Santos-Paulino, A. U. and Dogan, B., 2018. Trade Dependence, Liberalization, and Exports Diversification in Developing Countries. *Journal of African Trade*, *5*(1-2), pp.19-34. https://doi.org/10.1016/j.joat.2018.09.001

Papageorgiou, C., Spatafora, N. and Wang, K., 2015. Diversification, Growth and Volatility in Asia. *Policy Research Working Paper no. 7380*. The World Bank.

Prebisch, R., 1962. The Economic Development of Latin America and Its Principal Problems. *Economic Bulletin for Latin America*, *7*(1), pp.1-22.

Ricardo, D., 1891. Principles of Political Economy and Taxation. London: G. Bell and sons.

Romero, J. P. and McCombie, J. S. L., 2017. Thirlwall's Law and the Specification of Export and Import Functions. *Metroeconomica International Review of Economics*, *69*(2), pp.366-395. https://doi.org/10.1111/meca.12185

Saviotti, P. P. and Frenken, K., 2008. Export Variety and the Economic Performance of Countries. *Journal of Evolutionary Economics*, *18*(2), pp.201-218. https://doi.org/10.1007/s00191-007-0081-5

Singer, H. W., 1975. The Distribution of Gains between Investing and Borrowing Countries. In The Strategy Of International Development: Essays in the Economics of Backwardness, edited by Sir, A. C. and Mohinder, P., pp. 43-57. London, United Kingdom: Palgrave Macmillan.

Yong, H. H. A. and Laing, E., 2020. Stock Market Reaction to COVID-19: Evidence from U.S. Firms' International Exposure. *International Review of Financial Analysis*. In Press.

Zhang, S. Y., 2021. Using Equity Market Reactions and Network Analysis to Infer Global Supply Chain Interdependencies in the Context of COVID-19. *Journal of Economics and Business*, *115*(105974), p.105974. https://doi.org/10.1016/j.jeconbus.2020.105974

APPENDIX

Table A1 2-digit Harmonization System (HS) Product Code[3]

Code	Product Name
01	Live Animals
02	Meat And Edible Meat Offal
03	Fish and Crustaceans, Molluscs and Other Aquatic Invertebrates
04	Dairy Produce; Birds' Eggs; Natural Honey; Edible Products of Animal Origin, Not Elsewhere Specified or Included
05	Products of Animal Origin, Not Elsewhere Specified or Included
06	Live Trees and Other Plants; Bulbs, Roots and The Like; Cut Flowers and Ornamental Foliage
07	Edible Vegetables and Certain Roots and Tubers
08	Edible Fruit and Nuts; Peel of Citrus Fruit or Melons
09	Coffee, Tea, Maté and Spices
10	Cereals
11	Products of the Milling Industry; Malt; Starches; Inulin; Wheat Gluten
12	Oil Seeds and Oleaginous Fruits; Miscellaneous Grains, Seeds and Fruit; Industrial or Medicinal Plants; Straw and Fodder
13	Lac; Gums, Resins and Other Vegetable Saps and Extracts
14	Vegetable Plaiting Materials; Vegetable Products Not Elsewhere Specified or Included
15	Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes
16	Preparations of Meat, of Fish or of Crustaceans, Molluscs or Other Aquatic Invertebrates
17	Sugars And Sugar Confectionery
18	Cocoa And Cocoa Preparations
19	Preparations Of Cereals, Flour, Starch or Milk; Pastrycooks' Products
20	Preparations Of Vegetables, Fruit, Nuts or Other Parts Of Plants
21	Miscellaneous Edible Preparations
22	Beverages, Spirits and Vinegar
23	Residues and Waste from The Food Industries; Prepared Animal Fodder
24	Tobacco and Manufactured Tobacco Substitutes
25	Salt; Sulphur; Earths and Stone; Plastering Materials, Lime And Cement
26	Ores, Slag and Ash
27	Mineral Fuels, Mineral Oils and Products of Their Distillation; Bituminous Substances; Mineral Waxes

[3] The listed products are considered as *semi-related variety* products, by definition of Saviotti and Frenken (2008, pp. 209), as two-digit level of HS classification within one-digit class is used.

Table A1 Cont.

Code	Product Name
28	Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals, of Rare-Earth Metals, of Radioactive Elements or of Isotopes
29	Organic Chemicals
30	Pharmaceutical Products
31	Fertilisers
32	Tanning or Dyeing Extracts; Tannins and Their Derivatives; Dyes, Pigments and Other Colouring Matter; Paints and Varnishes; Putty and Other Mastics; Inks
33	Essential Oils and Resinoids; Perfumery, Cosmetic or Toilet Preparations Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes, Polishing or Scouring Preparations, Candles and Similar Article
34	Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes, Polishing or Scouring Preparations, Candles And Similar Articles, Modelling Pastes, "Dental Waxes" And Dental Preparations With A Basis
35	Albuminoidal Substances; Modified Starches; Glues; Enzymes
36	Explosives; Pyrotechnic Products; Matches; Pyrophoric Alloys; Certain Combustible Preparations
37	Photographic or Cinematographic Goods
38	Miscellaneous Chemical Products
39	Plastics And Articles There of
40	Rubber And Articles There of
41	Raw Hides and Skins (Other Than Furskins) And Leather
42	Articles of Leather; Saddlery and Harness; Travel Goods, Handbags And Similar Containers; Articles of Animal Gut (Other Than Silk-Worm Gut)
43	Furskins And Artificial Fur; Manufactures There of
44	Wood And Articles of Wood; Wood Charcoal
45	Cork And Articles of Cork
46	Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware And Wickerwork
47	Pulp of Wood or of Other Fibrous Cellulosic Material; Recovered (Waste and Scrap) Paper or Paperboard
48	Paper And Paperboard; Articles of Paper Pulp, of Paper or of Paperboard
49	Printed Books, Newspapers, Pictures and Other Products of The Printing Industry; Manuscripts, Typescripts and Plans
50	Silk
51	Wool, Fine or Coarse Animal Hair; Horsehair Yarn And Woven Fabric
52	Cotton
53	Other Vegetable Textile Fibres; Paper Yarn and Woven Fabrics of Paper Yarn
54	Man-Made Filaments
55	Man-Made Staple Fibres
56	Wadding, Felt and Nonwovens; Special Yarns; Twine, Cordage, Ropes and Cables and Articles There of
57	Carpets and Other Textile Floor Coverings
58	Special Woven Fabrics; Tufted Textile Fabrics; Lace; Tapestries; Trimmings; Embroidery
59	Impregnated, Coated, Covered or Laminated Textile Fabrics; Textile Articles of a Kind Suitable For Industrial Use
60	Knitted or Crocheted Fabrics
61	Articles of Apparel and Clothing Accessories, Knitted or Crocheted
62	Articles of Apparel and Clothing Accessories, Not Knitted or Crocheted
63	Other Made Up Textile Articles; Sets; Worn Clothing and Worn Textile Articles; Rags
64	Footwear, Gaiters and The Like; Parts of Such Articles
65	Headgear and Parts There of
66	Umbrellas, Sun Umbrellas, Walking-Sticks, Seat-Sticks, Whips, Riding-Crops and Parts There of
67	Prepared Feathers and Down and Articles Made of Feathers or of Down; Artificial Flowers; Articles of Human Hair
68	Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials
69	Ceramic Products
70	Glass and Glassware
71	Natural or Cultured Pearls, Precious or Semi-Precious Stones, Precious Metals, Metals Clad With Precious Metal, and Articles There of; Imitation Jewellery; Coin
72	Iron and Steel
73	Articles of Iron or Steel
74	Copper and Articles There of
75	Nickel and Articles There of
76	Aluminium and Articles There of
78	Lead and Articles There of
79	Zinc and Articles There of
80	Tin and Articles There of
81	Other Base Metals; Cermets; Articles There of
82	Tools, Implements, Cutlery, Spoons and Forks, of Base Metal; Parts There of of Base Metal
83	Miscellaneous Articles of Base Metal
84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts There of
85	Electrical Machinery and Equipment and Parts There of; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
86	Railway or Tramway Locomotives, Rolling-Stock and Parts There of; Railway or Tramway Track Fixtures and Fittings and Parts There of; Mechanical (Including Electro-Mechanical) Traffic Signalling Equipment of All Kinds
87	Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories There of
88	Aircraft, Spacecraft, and Parts There of
89	Ships, Boats and Floating Structures

Table A1 Cont.

Code	Product Name
90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Parts and Accessories There of
91	Clocks and Watches and Parts There of
92	Musical Instruments; Parts and Accessories ff Such Articles
93	Arms and Ammunition; Parts and Accessories There of
94	Furniture; Bedding, Mattresses, Mattress Supports, Cushions and Similar Stuffed Furnishings; Lamps and Lighting Fittings, Not Elsewhere Specified or Included; Illuminated Signs, Illuminated Name-Plates and The Like; Prefabricated Buildings
95	Toys, Games and Sports Requisites; Parts and Accessories There of
96	Miscellaneous Manufactured Articles
97	Works of Art, Collectors' Pieces and Antiques
98	Special Provisions

Note: The listed products are considered as *semi-related variety* products, by definition of Saviotti and Frenken (2008), as two-digit level of HS classification within one-digit class is used.